



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/893,803	06/28/2001	Bharath Rangarajan	F0660	7099

7590 03/24/2005

Himanshu S. Amin
Amin & Turocy, LLP
National City Center
1900 E. 9th Street, 24th Floor
Cleveland, OH 44114

EXAMINER

ROSENBERGER, RICHARD A

ART UNIT PAPER NUMBER

2877

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

42

Office Action Summary

Application No.

09/893,803

Applicant(s)

RANGARAJAN ET AL.

Examiner

Richard A. Rosenberger

Art Unit

2877

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12/06/2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) 30 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-29 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Art Unit: 2877

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miller et al (US 6,643,557) in view of the acknowledged prior art and Moslehi (US 5,719,495).

Miller et al teaches using scatterometry to control an etch process; see figure 4 in particular, with box 420 (“acquire and analyze scatterometry data”) and boxes 440 and 450 (“perform feedback corrections” and “perform feed-forward corrections”, respectively).

Miller does not explicitly teach using scatterometry to measure “multi-slope features”, although that reference does teach using is to obtain “line shape adjustments” (column 5, lines 19-21 and column 8, lines 13-15). The instant specification presents the necessary scatterometry techniques to practice the invention as being known in the prior art (page 12, lines 12-16: “The scatterometry system 822 employed in the measuring system may be any scatterometry system suitable to carry out the present . . . [s]catterometry systems are well known in the art and therefore further discussion related thereto is limited for sake of brevity.”).

As those in the art, as shown by Miller, knew that scatterometry can be used to control an etch process including “line shape adjustments”, and knew that scatterometry could be used to measure multi-slope features, it would have been obvious to control such multi-slope features using scatterometry in a system such as taught by Miller et al.

Art Unit: 2877

Miller does not appear to state that the measurements are made *in situ*. It is known in the art that such measurement and process control can be made *in situ*. Moslehi, for example, teaches the *in situ* use (column 8, line 21) of an optical measurement device for process control (column 8, lines 47-54) in processing tools such as etch processes (column 8, lines 24, 27). The measurement tool of Moslehi uses scattered light (throughout the patent, see claim 1, in particular column 22, line 15 of the patent, as a single example). Thus those in the art knew at the time the invention was made that optical measurement tools, including those which use scattered light, can be usefully used for *in situ* measurements for process control.

It is known in the art to use scatterometry to measure dimensions on a wafer for process control, and it is known that such optical measurements used for process control can be made *in situ*. It would have been obvious to use the scatterometry for such *in situ* measurements and control because it is known that scatterometry can be used to make measurements that are appropriate for process control, and it is known to make measurements appropriate for process control *in situ*. There is nothing in the art that would suggest to those in the art that scatterometry would cease to work if the object being measured is in a process chamber.

The various dependent claims all appear to be directed to material which is part of a known, and acknowledged and relied upon for adequate disclosure in the instant specification as known, methods of performing scatterometry and control of etch processes. Applicant has not argued any of the details of the dependent claims, and has not pointed out any detail of any dependent claim that is not a part of the acknowledged and relied upon as acknowledged, prior art. It is noted that in the appeal brief filed 17 October 2003, applicant presents the various claims as standing and falling together based only upon whether or not scatterometry was

Art Unit: 2877

explicitly claimed, and not upon any of the details of any of the various dependent claims beyond the claiming of scatterometry.

3. The remarks filed 6 December 2004 have been considered, but have not been found to be persuasive. Those in the art, knowing that scatterometry can be used to measure semiconductor features on a wafer, knowing that such measurements can be made *in situ* in an etch process, and knowing that these measurements can be used to regulate the etch process, would have found it obvious to use scatterometry to measure the semiconductor features on a wafer, to make the measurements *in situ* in an etch process, and to use the measurements to regulate the etch process. Those in the art would not forget that scatterometry can be made *in situ* in an etch process and that the measurements can be used to regulate the process merely because one known scatterometry method is being used rather than another known scatterometry method.

The rejection is based, in part, upon the prior art presented and relied upon, as prior art for adequacy of disclosure, in the specification. The remarks ignore this part of the rejection, and as such misrepresents the rejection. Since the remarks do not address a significant part of the combination of the rejection, the remarks are not a full and complete response to that rejection, and as such are not, cannot be, and do not appear to intended to be, an attempt to advance prosecution.

4. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period

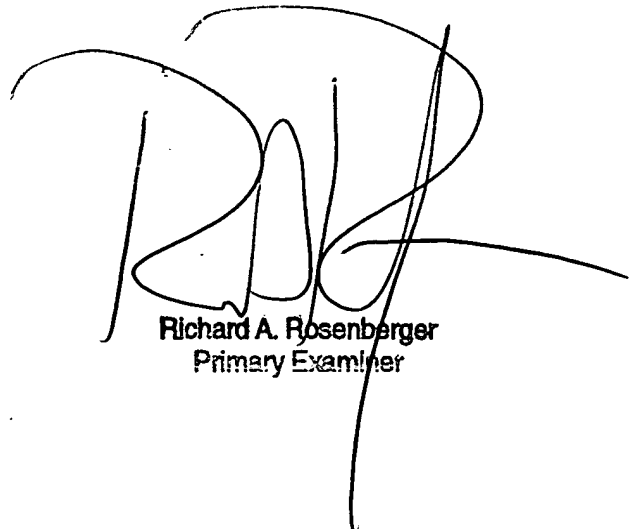
Art Unit: 2877

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Richard A Rosenberger whose telephone number is (571) 272-2428. The examiner can normally be reached on Monday through Friday during the hours of 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr. can be reached on (571) 272-2800 ext. 77. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Richard A. Rosenberger
Primary Examiner

R. A. Rosenberger
18 March 2005